



A  Sempra Energy[®] utility

San Diego Gas & Electric

Distribution Resources Plan

Tools and Methods

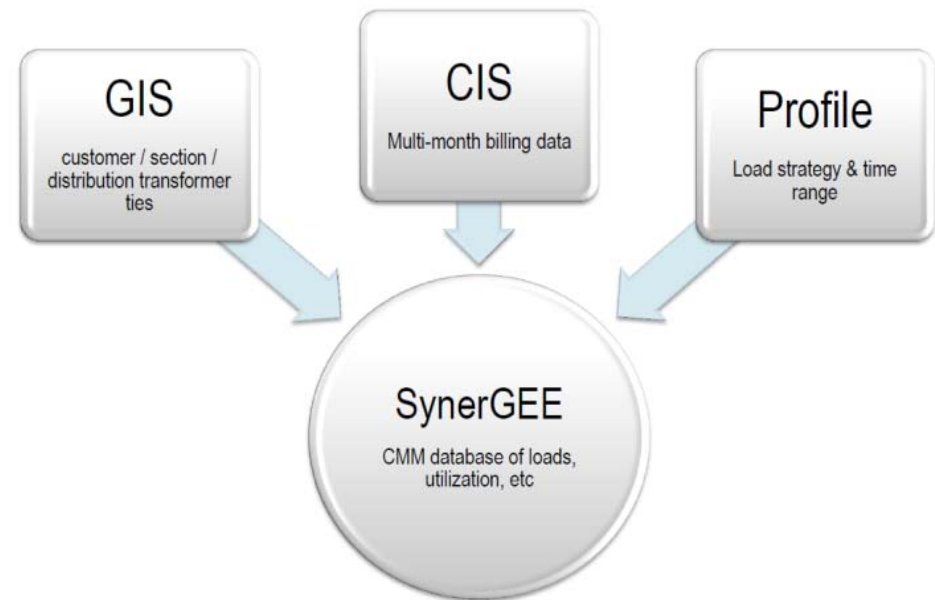


John Baranowski
Electric Distribution Planning Manager

Powerflow Analysis



- SDG&E utilizes SynerGEE to model its distribution system
- Currently upgrading SynerGEE to perform advanced analysis
- Full deployment of upgraded SynerGEE expected in 2016
- Once upgrade is complete, time domain analysis will be included in yearly process



Acronyms:

Geographic Information System (GIS)

Customer Information System (CIS)

Customer Management Module (CMM)

Forecasting



- Forecasting methodology modifications
 - Incorporate impacts of installed Distributed Energy Resources (DER)
 - Reduced or increased circuit/substation load due to installed Photovoltaic (PV)/Storage
 - Determine capacity factors for DER

North East - Working Copy

Substation: AV Avocado Engineer: Byron Shovlain

BUS: BUS2

Weather Factors: Prior: Coincidence Factors: Winter: Summer: 0.988 0.988 0.814 1.054 1.054 0.817

Bank: Circuit: 520

	Winter	Summer
Peak Date:	12/6/2013	9/16/2014
Peak Amp:	320.7	487.5
Cust Gen:	0.0	0.0
NEM:	57.5	57.5
Renewable:	0.0	0.0
Total Amp:	378.3	545.0

Normalized: Winter: 378 Summer: 538 Prior: 420

Adversed: Winter: 378 Summer: 568

Normal Growth (y1-5): 4.0 5.0

Normal Growth (y6-10): 4.0 5.0

Historic

	2013	2014	2015	2016	2017
Normal Annual Growth:	4	5	4	5	4
Specific Load Addition:	0	0	0	0	0
Normalized Peak:	289	420	378	382	543
Adverse Peak:	289	443	378	568	382
Adverse Peak W/Alt:	289	443	378	568	382
Planned Load Transfer:	0	0	0	0	0
Change In Growth:	0	0	0	0	0
Final Adverse Peak:	289	443	378	568	382
Final Adv Peak W/Alt:	289	443	378	568	382
Ampacity:	600	600	600	600	600
Spare Capacity:	< 20%	< 10%	27	22	17

Customer Data: 2013

Circuit KVA: 42722

KVA fed by Circuit: 0

Demand Factor: 0.28

Res: 42% 58% 0%

Load: 1717 616 0

Meters: 1717 616 0

Bank: Circuit: 520

*Peak Date: 12/06/2013 09/16/2014

*Peak Amp: 320.72 487.48

*Cogen: 0.03 0

NEM: 57.536923 57.536923

Renewable:

Total Amp: 378 545

Normalized: 378 538

Adversed: 378 568

Factors: 0.988 1.054

Calculated: Winter %: 67% Manual: 0%

Read Type: SCADA

Alternate Device for Peak:

Daily System Changes Major Customers Graph Peak Comments

Print Options

Current Practice: Modified Net Energy Metering (NEM) and renewable output included in forecasted load

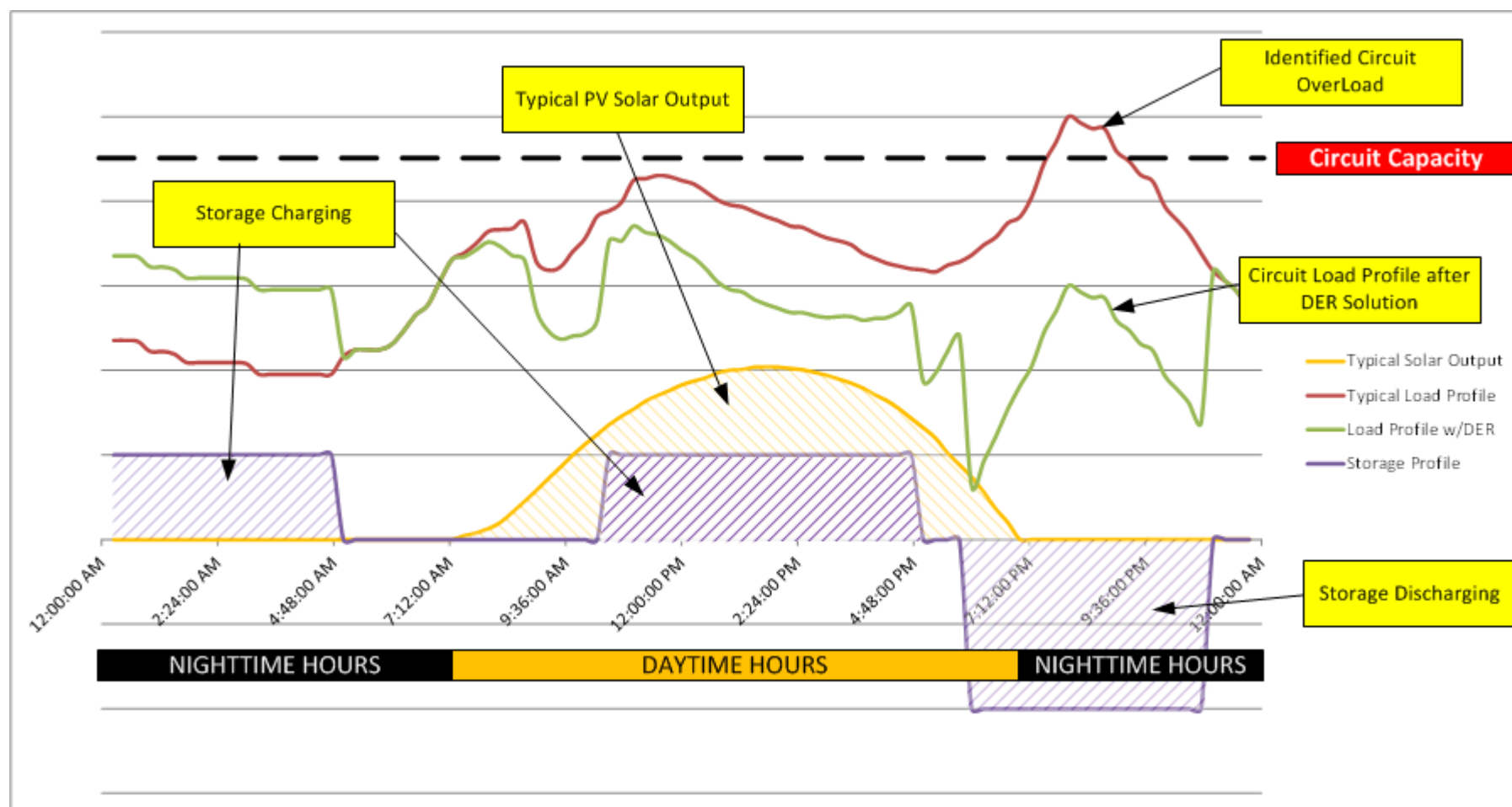
New Paradigm: Subtract modified NEM output from circuit and substation load

Integration Capacity



- Determine seasonal load curves at substation bus
- Overlay production/consumption curves of DER
 - PV Solar
 - Storage
 - Other DER
- Difference in curves may determine thermal capacity available for DER integration
 - Voltage considerations still apply
- SDG&E will identify size and required operating characteristics for DER installations based on net load curves

Integration Capacity – Paired Storage Use Case

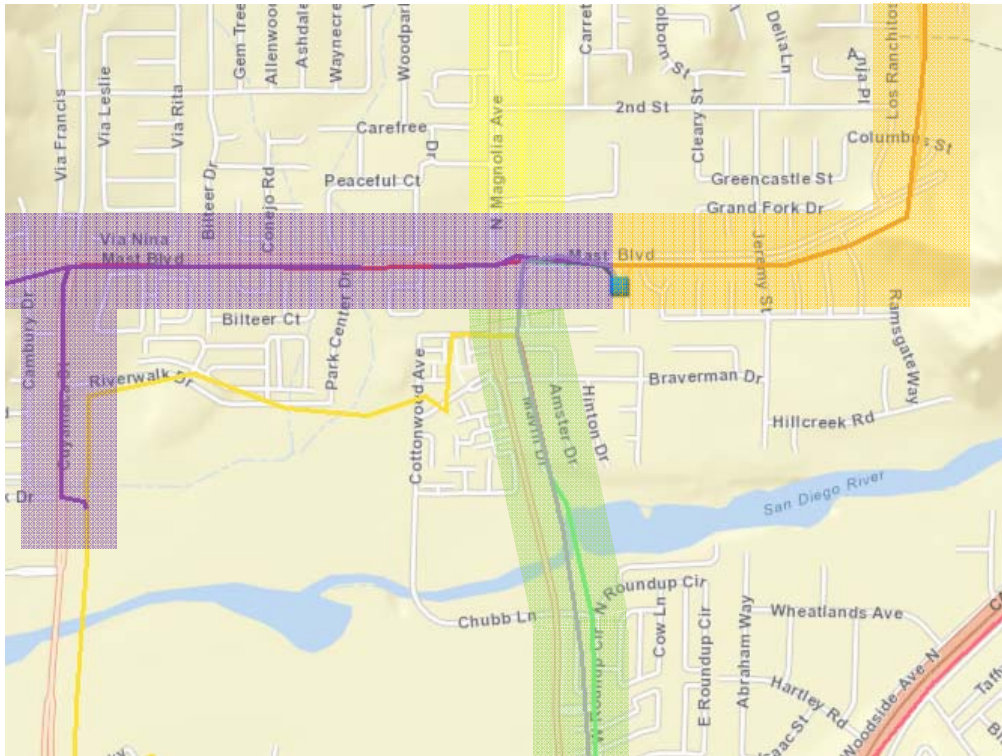


Optimal Locations



- SDG&E will identify optimal locations for DER as part of its DRP via several criteria:
 - Capital project deferral or avoidance
 - Investment to accommodate DER is cost effective, or
 - Required Investment benefits customers as well as DER
- Optimal locations depend on:
 - System need (circuit/substation capacity, voltage support, etc.)
 - System capacity, i.e., how much DER can the location accommodate?
- SDG&E to provide updated Renewable Auction Mechanism (RAM) maps with optimal substations identified

Optimal Locations



- Identify zones of 'minimum impact' to distribution circuits
- Close to feeder
 - Minimize interconnection facilities
- Prioritized based on system need
 - Avoidance of capital upgrades
 - New substation transformer
 - New distribution circuit
 - Circuit Reconductor

Benefits Analysis



- SDG&E will identify capital upgrades to address capacity deficiencies
- For those deficiencies with enough lead time, a Request for Proposal (RFP) for DER solutions will be issued
- SDG&E will compare the net cost of the DER solution to the cost of the capital upgrade to determine the cost effective solution
 - **\$DER Benefit** = \$Cap cost - \$NetDER cost - \$DER integration cost